2014-08-29

1) Fun with $0.99\overline{9}\ldots = 1$

$\frac{1}{10} + \frac{1}{100} + \frac{1}{1000} + \ldots = .1111\overline{1}$

2) www.calculus-help.com

Tutorials

first 2 or 3 . . .

3) Read your textbook.

2.1–2.2

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9) # solutions of $x^2+3x+8=0$

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

discriminant

$b^2-4ac = 9-4(1)(8)$

$= 9-32 < 0$

0 answers

axis of symmetry

$x^2+3x = x(x+3)$

zeros $= x=0, x=-3$

a of S $\Rightarrow x=-\frac{3}{2}$

$\left(-\frac{3}{2}\right)^2 + (3)\left(-\frac{3}{2}\right)+8$

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10) $f(x) = \log_2 x$, find $f(8)$

$\log_2 8 = x$

$2^x = 8$ AH, HA! $x = 3$

$\ln(2^x = 8)$

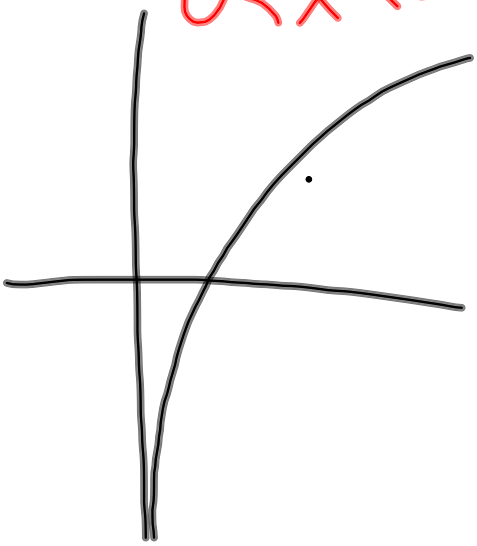
$\ln(2^x) = \ln(8)$

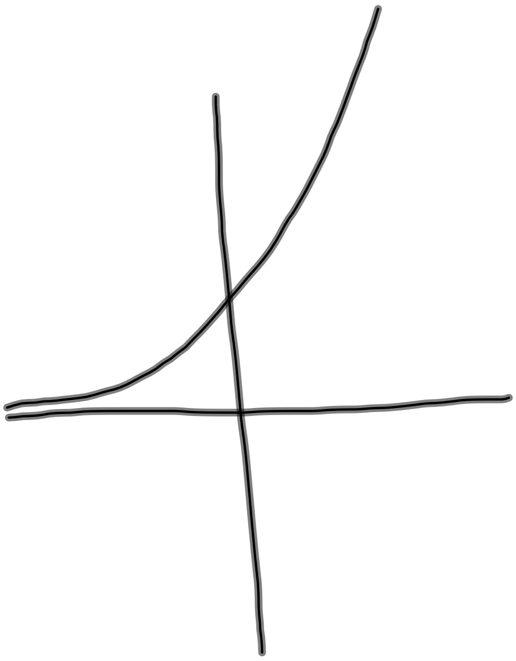
$x\ln(2) = \ln(8)$

$x = \frac{\ln(8)}{\ln(2)}$

11) $\log(x) < \log(2)$ reduces to 2014-08-29

$0 < x < 2$





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12) $\log_2(3x)+\log_2(2x)=3$

$\log_2(3x\cdot 2x)=3$

$\log_2(6x^2)=3$

$6x^2=2^3=8$

$x^2=\frac{8}{6}=\frac{4}{3}$

$x=\pm\sqrt{\frac{4}{3}}=\pm\frac{2}{\sqrt{3}}=\pm\frac{2\sqrt{3}}{3}$

$\log_a b=c$

$\Updownarrow$

$a^c=b$

A logarithm is an exponent

$\log(ab)=\log a+\log b$

$\log\left(\frac{a}{b}\right)=\log a-\log b$

$\log a^b=b\log a$

$\log_2(6x^2)=3$

$\log_2 6+\log_2 x^2=3$

$\log_2 x^2=3-\log_2 6$

$2\log_2 x=3-\log_2 6$

$\log_2 x=\left(\frac{3}{2}-\frac{\log_2 6}{2}\right)$

$2^{\log_2 x}=2^{\left(\frac{3}{2}-\frac{\log_2 6}{2}\right)}$

$x=2^{\left(3/2-\frac{\log_2 6}{2}\right)}$

$\sqrt{a}\cdot\sqrt{a}=a$ $(a\geq 0)$

$\sqrt[3]{a}\,\sqrt[3]{a}\,\sqrt[3]{a}=a$

$x=\frac{2^{3/2}}{2^{\frac{\log_2 6}{2}}}=\frac{(\sqrt{2})^3}{2^{\log_2\sqrt{6}}}$

$\frac{a^m}{a^n}=a^{m-n}$

$\frac{\log_2 6}{2}=\frac{1}{2}\log_2 6=\log_2\sqrt{6}$

$2^{\log_2\sqrt{6}}=\sqrt{6}$

$=\frac{(\sqrt{2})^3}{\sqrt{2}\cdot\sqrt{3}}$

$\sqrt{6}=\sqrt{2}\sqrt{3}$

$=\frac{(\sqrt{2})^2}{\sqrt{3}}=\frac{2}{\sqrt{3}}$

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13) $h(x) = x^2$; $g(x) = x+1$; $f(x) = x+3$

$$h(g(f(0))) = h(g(3))$$

$$= h(4)$$

$$= 16$$

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14) $f(x) = [x^2-1]^{1/2} = \sqrt{x^2-1}$

domain $\quad x^2-1 \geq 0$

$(x-1)(x+1) \geq 0$

NATURAL domain of a fn f(x) = the set of all xs for which f(x) is defined

Notice that the left hand side is 0 at $x=1, x=-1$ } solve $x^2-1=0$ first

$(x-1)(x+1)$

$+ \;\; +3 \;\; + \;\; 0 \;\; - \;\; -1 \;\; - \;\; 0 \;\; + + + +$

$-2 \quad -1 \quad 0 \quad +1 \quad \pi$

Range of a fn is the set of all "results" (y-values) given the specific domain

claim: x in (-1,1) means x^2-1 is always positive or always negative

$(-\infty,-1] \cup [1,\infty)$

Set Talk

A set is a collection of objects [order is not important]

{my left shoe, Ben's left shoe, ⋮ }

A set is denoted by { } (list the elements inside, or list the rule inside)

The null set is the only set with No elements. $\emptyset$

Solve $x^2=-1$ "over real #s"

Answer: $\emptyset$ [no solution]

The union of set A and set B [$A \cup B$] is the set of all the elements in A OR in B.

The intersection of set A and set B [$A \cap B$] is the set of all elements in BOTH A and B.

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15) $f(x) = 3x+3$, what is $f(f(2))$?

$f(9) = 30$

16) $-4 < \frac{3x+4}{8} < 12$

$-32 < 3x+4 < 96$

$\quad -4 \qquad -4 \qquad -4$

$\frac{-36}{3} < \frac{3x}{3} < \frac{92}{3}$

$-12 < x < \frac{92}{3} = 30\frac{2}{3}$

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17) $|5x-2|>1$

$5x-2<0$

$x<\frac{2}{5}$

$-(5x-2)>1$

$-5x+2>1$

$-5x>-1$

$\frac{-5x}{-5} \ \frac{-1}{-5}$

$x<\frac{1}{5}$

if $5x-2\geq 0$

$5x\geq 2$

$x\geq\frac{2}{5}$

$5x-2>1$

$5x>3$

$x>\frac{3}{5}$

calculus principle

Solve an absolute value equation by solving each individual piece.

$|5x-2|>1$

$|5x-2|=1$

$-(5x-2)=1$

$-5x+2=1$

$-5x=-1$

$x=\frac{1}{5}$

$5x-2=1$

$5x=3$

$x=\frac{3}{5}$

$>$ ~~$\neq$~~ $<$

+/− = +/−

WORKS/NOT

T = F = T

0 $\frac{1}{5}$ $\frac{2}{5}$ $\frac{3}{5}$ 10

GREATER

WIN

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18)

$$\frac{x+2}{|x-1|} > 0$$

$$\Downarrow$$

$$x+2 > 0$$

$$x > -2$$

domain: All xs except $x=1$